Psychological and Physiological Complications of Post-Burn Patients in Pakistan

A narrative review


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Abstract

Pakistan has a burn mortality rate of 6.5%, with a considerable percentage of survivors suffering from long-term complications due to lack of rehabilitation. The aim of this review is to outline the important physiological and psychological after-effects of burn injuries. Relevant articles were included by conducting a comprehensive search between 20th March and 25th May 2020. Psychological complications of burns include depression, post-traumatic stress disorder, anxiety, sleep disturbance, phobias, guilt, suicidal thoughts, and personality changes. Physiological complications include scarring, contractures, pain, muscle wasting, and hypothermia. Other complications include infections. The review revealed a scarcity of literature regarding the prevalence and impact of long-term complications in post-burn patients. Our findings include a lack of rehabilitative services and high rate of post-burn complications in Pakistan. Rehabilitation of burn patients should be a continuation of active treatment and should begin from the day of admission, to reduce the morbidity and improve the quality of life of burn patients.

Keywords: Burns; physiology; psychology; rehabilitation; quality of life.
Introduction

According to World Health Organization, burn injuries account for 180,000 deaths annually, with the majority of such injuries occurring in low- and middle-income countries. Pakistan has a burn mortality rate of 6.5%, with a burns center in Karachi reporting an exceptionally high mortality rate of 55.9%, which may be due to the lack of adequate infrastructure needed to manage burn patients. However, it is also possible that the more severely affected patients are admitted to the burns center, causing a difference in the general burn mortality rate and the mortality rate in rehabilitation centers. Females, children, and people living in poverty are at particular risk for burn injuries. The most common cause of burns is accidental injuries at home or the workplace. Although these are not usually fatal, they carry a significant morbidity risk.

According to a recent study conducted at Burns Center Civil Hospital Karachi, nearly 94% of burns were unintentional, while 1.5% were suicidal. Another study reports accidental burns to be around 83% prevalent, homicidal 10%, and suicidal burns to be 6.34%. Public and private sector hospitals throughout Pakistan face a large influx of burn patients, which places significant burden on the healthcare system. Despite a decrease in mortality, morbidity from burns is a significant cause of disability-adjusted life-years (DALYs) lost in low- and middle-income countries. In Pakistan, a limited number of burn rehabilitation centers in the country contribute to morbidity. Civil Hospital Karachi is the only hospital in Sindh that has a burns center, catering to patients from all parts of the province. Baluchistan, another province, does not have a single burn rehabilitation center. Hence, burn victims have no choice but to travel to Karachi for treatment. In a province like Khyber Pakhtunkhwa which also caters patients from tribal areas, the lack of burns centers is a glaring deficiency in its health infrastructure as one of the major burn units after three years of construction remains non-functional. There are only four burn units in Punjab, the most populated province of Pakistan, and most have limited resources and beds. Rehabilitative medicine is still a relatively new concept in Pakistan; emphasis is only on treating acute injury rather than preventing future complications. In Pakistan, there is generally a lack of awareness of burn victims and the challenges they have to endure. The long-term effects are not just limited to the physical complications of burn injuries like scarring or contractures; they also include the, at times more severe and debilitating, psychological ones, for example, depression and phobias. Treatment, therapy, and effective rehabilitation of burn patients can drastically increase if doctors of Pakistan and other third-world countries become
aware of these issues. Physicians must start looking beyond the hospital confined treatment given to burn patients and start developing hindsight and empathy about the future of the patients after they have gone home. Through this concise literature review, we aim to outline the important physiological and psychological after-effects of burn injuries and their risk factors, that clinicians must take into account during the treatment, discharge, follow-up, and rehabilitation of burn patients.

**Methodology**

A literature review on the possible complications that occur in burn patients was carried out by a comprehensive search through Google Scholar, PubMed, and Medline between the periods of 20th March 2020 to 25th May 2020. The search algorithms used were ‘post-burn complications’, ‘quality of life in burn patients’, ‘psychological complications in burn patients’, ‘physiological complications in burn patients’, ‘rehabilitation of burn patients’, and other variations. Relevant publications including literature reviews, systematic reviews, meta-analysis studies, newspaper articles, datasheets, and cross-sectional studies published between 1970 and 2020 were included. Only articles written in English were included. Full articles were read after screening the titles and abstracts. Each article was included in the review on the consensus of the authors. A total of 59 articles have been included in our literature review. Table 1 summarizes the findings of this literature review.

**Psychological complications**

Psychological problems manifest most visibly one to four years after discharge, as discussed in Smitten’s study. In his research, more than half of diagnosed patients fell within the category of DSM IV Axis I psychiatric disorders (consisting of all disorders except mental retardation and personality disorders) within 2-4 years after the burn injury. A recent study conducted at a tertiary care burns unit in Karachi reported a depression prevalence of 31.9 % in burn patients. Depression is a major factor that affects a patient’s quality of life. Depression scores remain stable at 1 month, 1 year and 2 years post-burn. It may also cause reduced body functioning. The visibility of the burn injury has led to a higher occurrence of depression and feelings of dissatisfaction with facial disfigurement being most
valuable in the estimation of psychological outcome.\textsuperscript{15, 16, 17} Total Body Surface Area of burn does not significantly affect depression scores according to a recent study conducted in Pakistan.\textsuperscript{17}

Post-traumatic stress disorder (PTSD) has been found in up to 45\% of burn survivors 1 year after the initial injury.\textsuperscript{18} Talking specifically about Pakistan, in a recent study, more than half of the burn population was found to be suffering from PTSD; high statistics due to stigmatization and lack of mental health care.\textsuperscript{19} In another study from Pakistan, it was found that PTSD symptoms are more severe in the female population due to an overall discouraging and repressive approach towards women and their well-being.\textsuperscript{20} Low socioeconomic condition of the patient is a risk factor for the development of PTSD.\textsuperscript{21} According to Roca’s study, individual symptoms of PTSD were more common in post-burn patients than the fully expressed syndrome; however, the prevalence of the complete syndrome had a delayed onset occurring mostly within 3 to 4 months after discharge.\textsuperscript{22, 23} The symptoms present included those that met PTSD criterion C, which is emotional numbing and symptoms of avoidance, such as an inability to recall events and estrangement from others, and PTSD criterion D, which involves increased arousals like heightened irritability and hypervigilance.\textsuperscript{22} PTSD is a greatly neglected sector of medicine and is underdiagnosed by doctors.\textsuperscript{24}

In follow-up cases, anxiety is a common presenting complaint; a study showed 37 \% of burn patients fell within the criteria of Hospital Anxiety and Depression Scale (HADS).\textsuperscript{16} According to this study, patients scoring 8-10 on HAD scale were regarded as borderline and those scoring more than 11 were regarded as actual cases. Increased size/intensity of burn injury increased the severity of anxiety.\textsuperscript{16} In a recent study conducted in Pakistan, the entire burns patient sample was found to have anxiety using the Hamilton Anxiety Rating Scale (HAM-A), with severe anxiety more prevalent in deep burn injuries.\textsuperscript{17}

Sleep is an important factor in the determination of the effects of a traumatic event on an individual since the quality of sleep is inevitably affected.\textsuperscript{25} Sleep disturbance in burn patients consists of lack of deep sleep, nightmares, and alterations in sleep patterns and sleep onset.\textsuperscript{25}
According to a study, around 87% of the burn patients had night-time awakenings. In Lee’s study, almost half the patients complained of sleep dissatisfaction 36 months after the injury.

Agoraphobias, with or without panic disorders, and social phobias are also incident in burn patients, albeit not as much as PTSD, anxiety, and depression. They may be found up to 1-2 years post-burn. The most prevalent among phobias are specific phobias that manifest after discharge and may increase the co-morbidity in burn patients.

Personality changes appearing in burn patients usually come under the heading of neuropsychiatric complications and may be due to the result of direct hypoxic injury to the brain. In a study on neuropsychiatric complications in burn patients, it was found that severe regression, a form of personality change, occurs in about 20% of adult burn patients and is characterized by child-like and primitive behavior patterns such as throwing tantrums.

In a recent systemic review conducted by Kornhaber (2018), the feeling of guilt, shame, and self-blame was emphasized as important manifesting problems among burn survivors. One of the most extreme psychological sequelae of burn injuries is suicide.

According to Van Loey’s extensive systemic review, 18 studies showed that previous psychiatric history like depression, anxiety, or mood disorders has a chief impact on post-burn mental health changes. Subjective factors like coping style, personality traits, and patient’s perception come into play in post-burn mental health changes. Social support and family attitude also considerably affect the intensity of psychological sequelae in burn patients, especially in children. In a study conducted in Pakistan, it was found that social support is extremely lacking in the lives of burn patients, both from family and friends, which undoubtedly hinders the healing process. The most common form of coping strategy used by burn patients is problem-focused coping, which contributes positively to post-traumatic growth such as appreciation of life and personal strength. Problem-focused coping or active coping consists of identifying the stressor, making a plan, taking an action, and seeking help/assistance for instrumental reasons, contributing to a positive change and helping the burn patient in the long-run.

According to Fong’s study, women tend to gravitate more towards emotional-coping, which
involves seeking social support for moral backing, sympathy, and understanding, which possibly may hinder the long-term psychological adjustment if employed for too long.\textsuperscript{35,36}

**Physiological complications**

Scarring is found in all types of burns except in superficial or first-degree burns, and can only be reduced by measures such as plastic surgery.\textsuperscript{37} According to Gangemi’s study, the most commonly used method employed to reduce a burn scar is excision and coverage with autologous skin grafts.\textsuperscript{38} According to a recent systemic review on the incidence of hypertrophic scarring in burn patients, the prevalence of scarring varies from 32\% to 72\%.\textsuperscript{39} Keloids are scars that grow and extend beyond the borders of the original burn wound, are often painful and pruritic, and never regress spontaneously.\textsuperscript{40} On the other hand, hypertrophic scars stay confined within the wound and ultimately regress.\textsuperscript{40} In studies devoted solely to hypertrophic and keloid scarring, it is stated that these are the greatest challenges that post-burn patients face, which significantly reduces the quality of life of the burn patient.\textsuperscript{40,41} According to Goel’s study, post-burn scars may be mature/immature, stable/unstable, and depigmented/hyper-pigmented, but regardless of the nature, they are inevitable after burn injury.\textsuperscript{37} Another study concludes that pathological scars, consisting of hypertrophic scars, hypertrophic scars with contractures and pure contractures, have an overall prevalence of 77\%.\textsuperscript{38}

Contracture development is a phenomenon in which the skin contracts over the wound to reduce its exposure site.\textsuperscript{37} In a recent study it was found that contracture severity mainly depends on the size of burn injury and length of hospital stay.\textsuperscript{42} Development of this post-burn complication is a common finding among burn patients in Pakistan as documented in Saaqi’s study. According to this study there is a high prevalence due to inadequate initial management of burn wounds such as lack of initiation of appropriate surgery, physiotherapy, and anti-deformity splintage, all leading to early contracture development.\textsuperscript{43}

Talking about chronic inflammation and metabolic changes in post-burn patients, Jeschke’s study displayed the persistence of these physiological reactions as long as 3 years after the initial burn injury.\textsuperscript{44} Cytokines particularly IL-6, IL-8, G-CSF, MCP-1, and acute-phase proteins are
considerably increased in burn patients during admission as well as after discharge. In another study, it is ascertained that burn patients stay in a state of chronic inflammatory response.

Muscle wasting is defined as a loss of at least 5-10% of the muscle mass; it is a common physiological complication in burn patients, occurring due to hyper-metabolism and altered protein kinetics such as increased protein breakdown and decreased protein synthesis. Managing post-burn hyper-metabolism is fundamental in decreasing burn-related muscle catabolism. According to Hart’s study, a larger burn wound area, increased weight of the patient, and a delay in surgery increases the risk of muscle catabolism. In a study conducted by Williams, it was established that increased production of catecholamines in burn patients results in the development of severe cardiac stress consisting of elevated heart rate, stroke volume, cardiac work, rate pressure product, myocardial oxygen consumption, and cardiac index; with these derailed values lasting as long as 2 years after the burn injury.

Hypothermia is also an important physiological complication in burn patients due to loss of skin which is the body’s main temperature regulator. Some of the factors affecting hypothermia in burn patients are the TBSA of burn injury, anesthesia, and surgery duration. Burn patients presenting with hypothermia have an increased risk of mortality.

**Pain**

According to Gauffin’s study, one third of the burn patients still felt pain 2 to 7 years after the initial burn injury. This affected the patients’ general activity, mood, work, and Health Related Quality of Life (HRQoL) as measured by EQ-5D. Burn pain is affected by factors like TBSA and the location of burn. The severity does not significantly depend on gender, age, or time of injury. Treatment procedures themselves also give rise to severe pain which affects successful rehabilitation after discharge and also increases the patients’ anxiety levels.

**Infection**

According to two different studies, infection is a major complication in hospitalized burn patients, that is influenced by the length of hospital stay, decreased immunity, the number of catheters inserted and TBSA of burn injury. The mechanism of this phenomenon is that
thermal energy in burns induces a state of immunosuppression which leads to increased susceptibility to infections. In Oncul’s study, nearly half of all burn wounds cultured positive for microorganisms such as Pseudomonas Aeruginosa, Staphylococcus epidermidis, Methicillin-sensitive strains of Staphylococcus, Enterococcus, and E.coli. In a recent study conducted in Pakistan, it was found that children are most afflicted due to comparatively decreased immunity and resilience. Post-burn infections, rather than the burn injury itself, may be a cause of mortality in burn patients. In another study conducted in Pakistan, sepsis was the most common cause of death in burn patients.

In Pakistan, the topic of burns has always been under researched and basic knowledge about complications that are bound to arise in burn patients after they have been discharged and treated is even rarer. Countless studies on epidemiology and hospital stay management have been reported, however, little information has been compiled about the physiological and psychological complications of burns which play a major role in effective rehabilitation of patients. This literature review provides a concise framework of the main complications that occur in burn patients. Mental health screening and early intervention in burn patients is recommended along with burn preventive sessions. There is also a scorching need to enhance the development of rehabilitation services. The scarcity of burn rehabilitation centers in the country supports the importance of this study. The already existing units should be brought in-line with international protocols. Consistent follow-up in multidisciplinary burn clinics is suggested as it is a predictor of better long-term results and social adjustments. It is hoped that through this study the dismal plight of burn patients and the importance of their rehabilitation can be highlighted.

Conclusion

This study summarizes various psychological and physiological complications in burn patients and reveals a scarcity of researches on the prevalence and impact of long-term burn complications in Pakistan. Lack of rehabilitative services and the high rate of post-burn complications in Pakistan have been brought to attention; depression, PTSD, anxiety, scarring and contractures being the most prevalent. Rehabilitation of burn patients should be a
continuation of active treatment and should begin from the day of admission to reduce morbidity and improve the quality of life of burn patients.

References


### Table 1: Complications in post-burn patients: The most common complications are presented in bold.

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